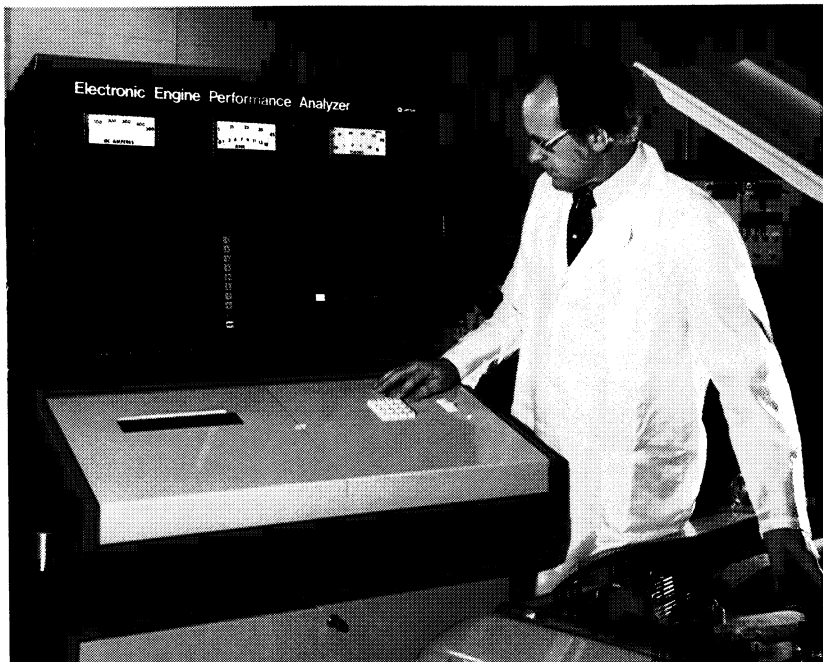


## Automatic Design System

In electronics, an integrated circuit is one wherein the separate functions of several components—transistors, for example—are performed within a single small piece of semiconducting material. A modern advance is the large-scale integrated (LSI) circuit, or array, which performs several thousand functions within a semiconducting chip typically smaller than a fingernail. Because of heavy demand for LSI arrays used in sophisticated aerospace electronic systems, NASA initiated a research project—conducted by Marshall Space Flight Center—to reduce the lengthy time and



the high cost involved in designing complex LSIs. Under contract to Marshall, RCA Corporation, Camden, New Jersey developed an automatic design technique whereby a computerized system stores standard circuit cells, retrieves them from its memory on request, then positions and interconnects them to form an LSI array.

RCA has applied the results of the NASA-sponsored research in producing LSIs for its own product line—communications equipment, for example—and for use in products manufactured by other companies, such as the automobile engine analyzer pictured; developed by Chrysler Corporation's Huntsville, Alabama, Division, the analyzer employs an LSI array to diagnose and solve problems for as many as 60 engine functions in less than four minutes. RCA's computerized system enables design in one to three months of LSIs which once required six to 12 months, and there has been an attendant reduction in design costs.

## Safe Handling Practices

The woman pictured below, an employee of Compugraphic Corporation, Wilmington, Massachusetts, is assembling a printed circuit board to be incorporated in phototypesetting equipment manufactured by the company. The black wrist band she is wearing is not an ornament; made of Velostat<sup>®</sup> conductive material, it creates a static-free environment at the work bench which reduces the chance of damage to the microelectronic chips on the circuit board. NASA technology contributed to this and other product-enhancing measures instituted by Compugraphic.

In 1977, Compugraphic was experiencing an unacceptable failure rate on microelectronic chips. Company engineers suspected that static electricity was causing the trouble because some electronic components are highly susceptible to damage by electrostatic charge. From a NASA Tech Brief, Compugraphic learned that Rockwell International, under contract to Johnson Space Center, had prepared a comprehensive report on safe handling practices for electronic components. On request, NASA provided the company a technical support package detailing some 50 safe handling procedures affecting workers, work areas, equipment and packaging materials. Compugraphic engineers made a survey of how the company's handling of microelectronic chips compared with NASA-recommended practices. Where poor practices were discovered, re-education of employees and other corrective measures were undertaken. Through use of the NASA technology, Compugraphic achieved a significant reduction of chip losses.

\*Velostat is a registered trademark of 3M Company.

